ORIGINAL ARTICLE

Diagnosis, Complications and Management of Forgotten DJ Stent - a two year experience

SAJID MAHMOOD[1], ASIF IMRAN[2], SHAHEER HUSSAIN[3], MUHAMMAD ARSALAN OMER[4], MUHAMMAD IRFAN SHABBIR GORAYA[5], MUHAMMAD SHAFI GHORI[6]

[1]Associated Professor Urology Unit-II, KEMU/Mayo Hospital, Lahore.
[2]Associate Professor of Urology, Deptt.of Urology, Nephrology and Kidney Transplantation Center, QAMC Bahawalpur.
[3]House Officer, Sheikh Zayed Hospital, Rahim Yar Khan
[4]Medical Officer, Deptt. of Radiology, DHQ Hospital Sheikhupura.
[5]Assistant Professor, Urology Unit-II, KEMU/Mayo Hospital Lahore.
[6]SR, Urology Unit-II, KEMU/Mayo Hospital Lahore.
Correspondence to: Dr. Sajid Mahmood, Email: dhmsk71@gmail.com

ABSTRACT

Background: Double DJ stents are basic tools commonly used in open & endoscopic urological procedures. Zimskind et al first introduced these stents in 1967, since then there use has increased day by day. These stents keep the ureter patent and help in prevention of ureter blockade, healing of anastomosis, restoration of edema and effective urinary drainage.

Methods: In our descriptive study we share a 2 year experience in management of 33 cases of forgotten DJ stents from April 2019 to April 2020. The study was conducted in Mayo Hospital, Unit II. Informed consent & ethical issues were taken into account. All the cases where stents were forgotten for more the 6 months were included in the study. Diagnosis was made on the basis of history, examination, CBC, Urine C/E, Urine Culture & sensitivity, USG KUB, X/ray KUB digital, Plain CT KUB 3D with renal protocol & DTPA renal scan.

Results: Out of 33 cases, 7(21.3%) were female & 26(78.7%) were male. Age range was 22 to 63 years average indwelling time of forgotten DJ stent was 1.97 year. Shortest indwelling time was 9 months, longest indwelling time was 12 years. Out of 33 cases, 5 (15.1%) were from our uni, 28 cases (84.8%) were from other hospitals . In 27(81.8%) cases stents removed endoscopically.. 7(21.21%) needed open surgery to remove the stent, out of these 6 cases, 1 underwent nephrectomy as kidney became pyelonephritic & nonfunctional. 3 cases underwent pylolithothomies, 1 underwent ureterolithotomy & 1 underwent vesicolithothomy.

Conclusion: With increasing use of DJ stent in urology, cases of forgotten DJ stent are increasing and presenting a substantial management challenge to the urologist especially in the developing countries. Lack of pre & post - operative counselling, lack of follow up, illiteracy, long distance which the patient has to travel to reach the health care facility and monetary issues are the main causes of the forgotten DJ stent.

Keywords: Forgotten DJ stent, ESWL, PCNL (Percutaneous Nephrolithotomy). URS (Ureterorenoscopy).

INTRODUCTION

Double-J (DJ) stents are among the basic commonly used tools in open as well as endoscopic urological procedures. These stents have curving ends that prevent the stents slipping into the bladder or the kidney. The length of the DJ stent varies from 24cm to 30 cm in adults. The DJ stents come in different diameters or gauges to fit for different sized ureters. These are also called pigtail stents. These were first induced in 1967 by Zimskindet al[1]. The ureteral stents are hollow tubes which drain the kidneys into the urinary bladder through the ureteric lumen. Since 1967 many advancements have been made in the stent designs, material, shape & coating[2]. Ureteral stents can also be used in conditions like hydronephrosis due to ureteric stone, pregnancy and malignant neoplasm[3]. These stents are made of thermo plastic material such as polyurethane and thermo set elastomass such as silicone and hydrogel[4] .Polyurethane stents are easy to form and have high drainage capacity, whereas silicon shows the best bio compatibility than the former one.There is no ideal ureteral stent yet invented.There are three technological parameters that play a key role on the performance of an ideal ureteral stent. But there is no ideal ureteral stent yet invented. These are its material, design and surface coating[5]. Double J refers to the most common type of stent design that was initially designed by Finney in 1978[6]. Now the engineers are focusing on mechanical strength, flexibility, bio compatibility, surface roughness and cost effectiveness. First ureteral stent was made of polyethylene, it was rigid and more prone to breakage. Later on Gorman et al introduced a mixture of polyethylene and polyurethane. They were more resistant to breakage and encrustation. Then came silicon ureteral stent, they have flexibility and lubricious properties However they are relatively rigid and appear to have 30% encrustation rate at 10 weeks. In spite of their advantages, ureteral stents are not free from side effects and morbidity. Forgotten DJ stents can cause variety of complications ranging from haematuria, stent blockage, encrustation, migration, fragmentation, urinary tract infection and deterioration of renal functions[7]. In literature, fistulous communication to iliac arteries have been reported[8]. Mortality has also been reported in the literature[9]. DJ stent removal is simple endoscopic urological procedure, but the removal of forgotten DJ stent might be the most challenging procedure. In our descriptive study we evaluated the diagnosis, complications and management of forgotten DJ stents.

Received on 21-06-2020
Accepted on 07-11-2020

MATERIAL & METHOD

It was a descriptive study conducted in Urology Unit-II, King Edward Medical University/ Mayo Hospital Lahore from June 20-18 to June 20-20 (two years), 33 cases with forgotten DJ stents were included in the study. In all these cases stent were forgotten for more than 6 months. Ethical issues were taken into account. Detailed history and examination was conducted. Age, sex, address, duration of stent, presenting symptoms, complication associated with stents, procedures performed for retrieval of stents, literacy level and home distance were all recorded. CBC, urine complete, urine culture and sensitive, RFT's, Blood sugar, ultrasonography KUB, digital X/Ray KUB and plain CT KUB were conducted in all the patients. DTPA Renal scan was done in selective cases. Sterile urine was ensured before intervention. Follow up was maintained till 6 months after the retrieval of stent. However cases of chronic stone former were followed for one year. Technology of telemedicine used in follow-up of those patients who were from remote areas.

RESULTS

Thirty three cases were include in the study. Out of these 33 cases, 7(21.3%) were female and 26(78.7%) were male. Age range was 22-63 years. Average indwelling time of a forgotten DJ stent was 1.97 years. Shortest indwelling time was 9 months and longest indwelling time was 12 years. Out of 33 cases, 5(15.1%) were from our unit and 28 cases (84.8%) were from other hospitals. In 16(48.4%) cases encrustation was on the upper end of the stent. In 13(39.3%) cases encrustation was on the lower end. In 4(12.1%) encrustation was found on the entire length of the DJ stent. In 2(6%) cases symptoms and signs of urosepsis found. In a single patient (3.3%) deterioration of renal; function was found. Table.1 shows presenting symptoms and signs of forgotten DJ stents. Tabhle.2 shows frequency of complications associated with forgotten DJ stent. Table.3 shows the procedures implied for retrieval of ureteral stents.

Table1: Frequency of Signs and Symptoms of Forgotten DJ Stent (n=33)

Presenting Sign & Symptoms	n	%age
Asymptomatic	3	9.09
Flank, hypogastric Pain &dysuria	30	90.9
Painful hematuria	11	33.3
Irritative symptoms	8	24.2
Difficulty in sexual functions	5	15.1
Sign & symptoms of urosepsis	2	6
Deterioration of renal function	1	3

Table2: Frequency of complications associated with Forgotten DJ stent (n=33)

Complications	Cases	%age
LUTS	30	90.9
Encrustation	30	90.9
Stone formation	23	69.6
Fragmentation	7	21.2
Migration	2	6
Painful Hematuria	11	33.3
Urosepsis & deterioration of renal function	3	9.1

Table 3: Procedure used for retrieval of DJ StentsN=33

Procedure	Cases	%age
Cystoscopy & Removal	3	9
Liitholepaxy& Removal	9	27.2
ESWL Followed By Removal	15	45
URS followed By Removal	15	45
URS with Lithoclast	15	45
Pyelolithotomy	3	9.9
Ureterolithotomy	1	3
Vesicolithotomy	1	3
Nephrectomy	1	3

DISCUSSION

Management of forgotten DJ stents can be a challenge for the urologists. There is significant morbidity and rarely mortality if they are not managed carefully[10].

The most common complication found in forgotten DJ stent is encrustation. In a recent review by the Takashi Kawahara et al, the stent encrustation occurred in 26.8% in less than six weeks, 56.6% at six to twelve weeks and 75.9% when stent is in for more than 12 weeks[11].

In our study encrustation was 90.9%, when stent were in for more than 12 weeks. We found only 3 cases (9.09%) encrustation free. The exact causes of encrustation are not clear. However, it has been found that hydrophilic coated polyurethane stent encrusts faster as compared to silicone nonhydrophilic stent[12]. Chronic stone farmers have three times more encrustation rate as compared to normal person[13].

Bacterial colonization, outflow obstruction, biofilm on stent and pregnancy are other risk factors which favor encrustation[14].

In our study encrustation involved more upper end of the stent (48.4%) as compared to lower end (39.3%). Takashi Kawahara et al reported similarly in their study with upper end involved in 41.8% and lower end 22.21%. This has been attributed to the effective peristalsis in the lower end[15]. More involvement of th

Forgotten stents may be asymptomatic or present with variety of symptoms. We found 3/33 cases asymptomatic. LUTS found in 30/33 cases. In 11/33 cases 33 cases we found painful haematuria. 3/33 cases presented with urosepsis. In a study by Rahul Gupta et al LUTS were most common symptoms in forgotten DJ stents[17].

In 5/33 cases there was difficulty in performing sexual activity. The forgotten stents can cause impaired quality of sexual life both male and female[18]. In our study all cases with sexual imparity were male. We found painful haematuria in 11 cases (33.3%). Haematuria is a common complication of ureteral stent reported in the literature[19]. The triad of flank pain, haematuria and LUTS have been reported as clinical presentation of forgotten DJ stent[20].

Stone formation is a known complication of forgotten DJ stent. In our study we found stone formation in 23 cases (69.6%) either on proximal or distal end. Urosepsis and deterioration of renal function has also been reported in literature. We found 3 cases (9.09%) with history of fever, flank pain, lower urinary tract symptoms, raised TLC and positive urine culture. In one study urosepsis has been reported 42.8%[17].

Stent fragmentation and migration has also been reported in literature.We found stent fragmentation in 7 cases (21.2%) and stent migration in 2 cases (6.06%). Stents with full coil are less prone to migration as compared to stent with J shape, similarly polyurethane stent are less prone to migration as compared to silicon stent. Stent with shorter length are more prone to migrate [21]. Side holes being weak points, interaction with urine, severe inflammatory reaction in situ, kink during insertion are causes of fragmentation[22].

Removal of DJ stent is simple endoscopic urological procedure. However, removal of a complicated forgotten DJ stent can pose a management challenge. Many approached have been described in the literature for removal of such stents[23]. Very few studies have formulated an algorithms for the management of such ureteral stents[24].

Still debate is going on which method is best one.Multimodal management approach is recommended as the best. Endourological management is main stay of retrieval of such forgotten stents. However, it is supplemented with other procedures. Ecke and his colleagues recommended removal of distal part of stone burden first with lithoclast. PCNL for proximal stone burden [25] ·Flame and associates recommended ESWL for low volume encrustation or stone in thekidney[26].K. Mistry et al recently has described a two stage bail out technique [27].

In this they placed a new stent adjacent to the encrusted non yielding stent for two to four weeks, which caused dilatation of the ureter and facilitated the removal of primary stent by simple pull or traction. In our study we followed a multimodal endourological approach with auxiliary open procedure. We followed principle of gentle traction under direct vision or under fluoroscope, if there was any resistance in stent retrieval we abandoned the procedure to avoid any disaster of ureteral avulsion or stent breakage. The patients were planned for stent removal under anesthesia with disintegration of encrustation or stone with pneumatic lithotripsy.We first dealt with bladder encrustation or stone, then the proximal one.

CONCLUSION

The DJ stent is a fundamental part of urological procedures. With increase in their use, the cases of forgotten DJ stent are increasing and presenting a substantial management challenge to the urologist especially in the developing countries. Forgotten DJ can be a source of severe morbidity, therefore their use must be judicious. Lack of pre and post-operativecounselling, lack of follow up, illiteracy, monetary issues and the long distance which the patient has to travel to reach the health care facility are the main causes of the forgotten DJ stents. Endoscopic retrieval is the mainstay of the management. A multimodality and multi auxiliary approach is suitable option. In literature,we do not have clear cut guide lines for management of such ureteral stents.

REFERENCES

1. Zimskind PD, Fetter TR, Wilkerson JL. Clinical use of long-term indwelling silicone rubber ureteral splints inserted cystoscopically. The Journal of urology. 1967 May;97(5):840-4.
2. Chew BH, Lange D. Advances in ureteral stent development. Current opinion in urology. 2016 May 1;26(3):277-82.
3. Olivera ST, Gjulsen S, Katica Z. Obstructive nephropathy as a result of malignant neoplasms: A Single Centre Experience. BANTAO J. 2010;8(2):71-4
4. Hofmann R, Hartung R. Ureteral stents—materials and new forms. World Journal of Urology. 1989 Sep 1;7(3):154-7.
5. Mosayyebi A, Manes C, Carugo D, Somani BK. Advances in ureteral stent design and materials. Current urology reports. 2018 May 1;19(5):35.
6. Finney RP. Experience with new double J ureteral catheter stent. The Journal of urology. 1978 Dec;120(6):678-81.
7. Mohan-Pillai K, KEELEY JR FX, MOUSSA SA, SMITH G, TOLLEY DA. Endourological management of severely encrusted ureteral stents. Journal of endourology. 1999 Jun;13(5):377-9
8. Damiano R, Oliva A, Esposito C, De Sio M, Autorino R, D'Armiento M. Early and late complications of double pigtail ureteral stent. Urologiainternationalis. 2002;69(2):136-40.
9. Singh V, Srinivastava A, Kapoor R, Kumar A. Can the complicated forgotten indwelling ureteric stents be lethal?.International urology and nephrology. 2005 Sep 1;37(3):541-6.
10. Lynch MF, Ghani KR, Frost I, Anson KM. Preventing the forgotten ureteral stent: implementation of a web-based stent registry with automatic recall application. Urology. 2007 Sep 1;70(3):423-6.
11. Kawahara T, Ito H, Terao H, Yoshida M, Matsuzaki J. Ureteral stent encrustation, incrustation, and coloring: morbidity related to indwelling times. Journal of endourology. 2012 Feb 1;26(2):178-82.
12. Tunney MM, Keane PF, Jones DS, Gorman SP. Comparative assessment of ureteral stent biomaterial encrustation. Biomaterials. 1996 Jan 1;17(15):1541-6.
13. Robert M, Boularan AM, El Sandid M, Grasset D. Double-J ureteric stent encrustations: clinical study on crystal formation on polyurethane stents. Urologiainternationalis. 1997;58(2):100-4.
14. Vanderbrink BA, Rastinehad AR, Ost MC, Smith AD. Encrusted urinary stents: evaluation and endourologic management. Journal of endourology. 2008 May 1;22(5):905-12.
15. Bultitude MF, Tiptaft RC, Glass JM, Dasgupta P. Management of encrusted ureteral stents impacted in upper tract. Urology. 2003 Oct 1;62(4):622-6.
16. Singh I, Gupta NP, Hemal AK, Aron M, Seth A, Dogra PN. Severely encrusted polyurethane ureteral stents: management and analysis of potential risk factors. Urology. 2001 Oct 1;58(4):526-31.
17. Murthy KV, Reddy SJ, Prasad DV. Endourological management of forgotten encrusted ureteral stents. International braz j urol. 2010 Aug;36(4):420-9.
18. Sighinolfi MC, Micali S, De Stefani S, Mofferdin A, Grande A, Giacometti M, Ferrari N, Rivalta M, Bianchi G. Indwelling ureteral stents and sexual health: a prospective, multivariate analysis. The Journal of urology. 2007 Jul;178(1):229-31.
19. Patil S, Raghuvanshi K, Jain DK, Raval A. Forgotten ureteral double-J stents and related complications: a real-world experience. African Journal of Urology. 2020 Dec;26(1):1-5.
20. Seedat Y, Adam A. Flank pain, haematuria and poor patient compliance: beware the'forgotten'JJ stent!. SAMJ: South African Medical Journal. 2009 Dec;99(12):860-1.
21. BREAU RH, NORMAN RW. Optimal prevention and management of proximal ureteral stent migration and remigration. The Journal of urology. 2001 Sep;166(3):890-3.q
22. Ilker Y, Türkeri L, Dillioğlugil Ö, Akdaş A. Spontaneous fracture of indwelling ureteral stents in patients treated with extracorporeal shock wave lithotripsy: two case reports. International urology and nephrology. 1996 Jan 1;28(1):15-9.
23. Borboroglu PG, Kane CJ. Current management of severely encrusted ureteral stents with a large associated stone burden. The Journal of urology. 2000 Sep 1;164(3):648-50.
24. Lam JS, Gupta M. Tips and tricks for the management of retained ureteral stents. Journal of endourology. 2002 Dec 1;16(10):733-41.
25. Ecke TH, Hallmann S, Ruttloff J. Multimodal stone therapy for two forgotten and encrusted ureteral stents: a case report. Cases Journal. 2009 Dec 1;2(1):106.
26. Flam TA, Brochard M, Zerbib M, Debre B, Steg A. Extracorporeal shock-wave lithotripsy to remove calcified ureteral stents. Urology. 1990 Aug 1;36(2):164-5.
27. Mistry K, Pal P, Chitale S. A simple two-stage "bailout" technique for the removal of an unyielding ureteric stent. Urology. 2013 Jul 1;82(1):242-4.